

**REMARKS**

Claims 10-19 are pending and under consideration in the application. Claims 10 and 12 have been amended herewith. Support for these amendments may be found at least on pages 8 and 16-21. Applicants respectfully submit that no new matter has been introduced by way of this amendment.

In the attached Appendix, please find a copy of Claims 10 and 12 as now amended with markings to show the changes made.

The Examiner has objected to the IDS filed March 30, 2000, as failing to comply with 37 CFR §1.98(a)(3). Claims 10-19 stand rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 10-19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Humphrey, Jr. et al., U.S. 5,922,493.

In response to the Examiner's objection to the IDS as failing to comply with 37 CFR §1.98(a)(3), we submit with this amendment the English abstracts of the non-English references to provide a concise explanation of the relevance as presently understood. Applicants apologize for the failure to submit the references with the last communication dated May 29, 2001.

The rejection of Claims 10-19 under 35 U.S.C. § 112, first paragraph, is respectfully traversed. Applicants submit that the rejection has been rendered moot in light of the instant amendment. Claims 10 and 12 have been amended to recite, among other things, "a fluorocarbon polymer having a weight-average molecular weight of greater than 600,000." Applicants may amend a claim to exclude subject matter disclosed in the prior art and still find support for the narrower range in the specification. *In re Johnson and Farnham*, 194 U.S.P.Q. 187, 195-96 (CCPA 1977). The range for a fluorocarbon polymer having a weight-average molecular weight of greater than 600,000 is supported by the specification of the present application at least on pages 8 and 16-21. Applicants respectfully request withdrawal of the §112, first paragraph, rejection of Claims 10-19.

The rejection of Claims 10-19 under 35 U.S.C. § 103(a) as being unpatentable over Humphrey, Jr. et al., U.S. 5,922,493 is respectfully traversed.

Humphrey, Jr. et al. disclose an electrochemical cell having a positive electrode, an absorber-separator and a negative electrode wherein at least one of the electrodes or absorber-separator comprises a porous polyvinylidene fluoride (PVDF). The porous PVDF electrodes have an electrode material and the porous PVDF absorber-separator has an electrolyte material. The PVDF molecular weight values disclosed in Humphrey, Jr. et al. range from 86,900 to 572,500. Humphrey, Jr. et al. does not teach or suggest a solid electrolyte having a matrix polymer having a fluorocarbon polymer with a weight -average molecular weight of greater than 580,000.

Claim 10 has been amended to recite "a solid electrolyte comprising a matrix polymer comprising a fluorocarbon polymer having a weight -average molecular weight of greater than 600,000."

A prima facie case of obviousness can be rebutted if the applicant (1) can establish "the existence of unexpected properties in the range claimed" or (2) can show "that the art in any material respect taught away" from the claimed invention. *In re Malagari*, 499 F.2d 1297, 1303, 182 U.S.P.Q. 549, 553 (CCPA 1974). Applicants have unexpectedly discovered that a fluorocarbon polymer having a weight-average molecular weight of greater than 580,000 provides excellent superior initial characteristics and long-term reliability relative to fluorocarbon polymer having a weight-average molecular weight less than 580,000 as provided in the enclosed Inventor's Rule 132 Affidavit. Claim 10, as amended, recites "a fluorocarbon polymer having a weight -average molecular weight of greater than 600,000" which falls within the critical range of greater than 580,000. The cited art fails to teach "a fluorocarbon polymer having a weight-average molecular weight of greater than 600,000" and fails to recognize that superior characteristics result with the use of a fluorocarbon polymer having a weight-average molecular weight of greater than 580,000 as the matrix polymer of a solid electrolyte. Applicants respectfully submit that Claim 10 is patentable over Humphrey, Jr. et al.

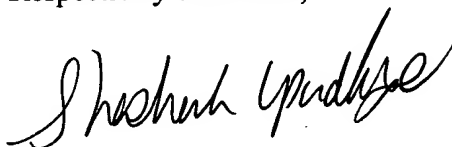
Claims 11-19 depend from independent Claim 10. Applicants submit that when the recitations of Claims 11-19 are considered in combination with Claim 10, Claims 11-19 are likewise patentable over Humphrey, Jr. et al.

Applicants respectfully request the withdrawal of the § 103(a) rejection of Claims 10-19 as being unpatentable over Humphrey, Jr. et al., U.S. 5,922,493.

CONCLUSION

In view of the foregoing, it is submitted that Claims 10-19 are patentable. It is therefore submitted that the application is in condition for allowance. Notice to that effect is respectfully requested.

Respectfully submitted,



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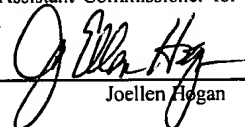
Date: 14 Jan., 2002

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Joellen Hogan

**APPENDIX**

**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**In the Claims**

10. (Twice Amended) A solid-electrolyte secondary battery comprising:  
a positive electrode;  
a negative electrode;  
a solid electrolyte comprising a matrix polymer comprising a fluorocarbon polymer  
having a weight-average molecular weight of greater than [572,500] 600,000.
12. (Twice Amended) The solid-electrolyte secondary battery of Claim 10 wherein the  
matrix polymer comprises 30 percent or more by weight of the fluorocarbon polymer [that has]  
having a weight-average molecular weight of greater than [572,500] 600,000.

11317959

Powered by  **DIALOG****LITHIUM SECONDARY BATTERY****Publication Number:** 06-243896 (JP 6243896 A) , September 02, 1994**Inventors:**

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- KAYA MASANORI
- KOGA KEIJI
- ARAI HITOSHI
- KOMORITANI TSUNEO
- MIYAKI YOUSUKE

**Applicants**

- TDK CORP (A Japanese Company or Corporation), JP (Japan)

**Application Number:** 05-347947 (JP 93347947) , December 24, 1993**International Class (IPC Edition 5):**

- H01M-010/40
- H01M-004/02
- H01M-004/62

**JAPIO Class:**

- 42.9 (ELECTRONICS--- Other)
- 14.2 (ORGANIC CHEMISTRY--- High Polymer Molecular Compounds)
- 23.1 (ATOMIC POWER--- General)

**JAPIO Keywords:**

- R003 (ELECTRON BEAM)
- R052 (FIBERS--- Carbon Fibers)
- R124 (CHEMISTRY--- Epoxy Resins)
- R125 (CHEMISTRY--- Polycarbonate Resins)

**Abstract:**

**PURPOSE:** To prevent the dropping of a positive electrode material and a negative electrode material and reduce a decrease in capacity when charge and discharge are repeated by sticking the negative electrode material and/or the positive electrode material to the surface of a collector by a crosslinking polymer-containing binder.

**CONSTITUTION:** Carbon used as an active material is preferably graphite and is used in powder. Its

powder preferably has an average grain diameter of 1-30. $\mu$ m. A lithium ion is preferably lithium-containing composite oxide as an intercalating or doping layer compound. The negative electrode material and/or the positive electrode material, preferably, both the materials are stuck to the surface of a collector by a crosslinking macromolecule binder. The crosslinking polymer is preferably a fluorine-containing one. Particularly, a crosslinking agent is preferably polyamine, polyol, peroxide. A crosslinking assistant for the peroxide is preferably that crosslinked by using triazine dithiol. (From: *Patent Abstracts of Japan*, Section: E, Section No. 1636, Vol. 18, No. 626, Pg. 32, November 29, 1994)

JAPIO

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Dialog® File Number 347 Accession Number 4571996



**Polymeric electrode and electrolyte for electrochemical cell and battery - comprises porous polyvinylidene fluoride combined with electrode material and absorber-separator between positive electrode and negative electrode**

**Patent Assignee:** ELF ATOCHEM NORTH AMERICA INC; ATOFINA CHEM INC

**Inventors:** GABOURY S R; HUMPHREY J S

### Patent Family

Patent Number	Kind	Date	Application Number	Kind	Date	Week	Type
EP 730316	A1	19960904	EP 95120660	A	19951228	199640	B
JP 8250127	A	19960927	JP 9668932	A	19960301	199649	
HU 9600516	A2	19961230	HU 96516	A	19960301	199714	
CN 1137178	A	19961204	CN 96103470	A	19960228	199805	
TW 342537	A	19981011	TW 95113659	A	19951220	199908	
SG 59922	A1	19990222	SG 96391	A	19960123	199931	
US 5922493	A	19990713	US 95399701	A	19950303	199934	
			US 97785285	A	19970121		
HU 219058	B	20010228	HU 96516	A	19960301	200121	

**Priority Applications (Number Kind Date):** US 95399701 A ( 19950303); US 97785285 A ( 19970121)

**Cited Patents:** EP 90598 ; US 5296318 ; WO 9506332

### Patent Details

Patent	Kind	Language	Page	Main IPC	Filing Notes
EP 730316	A1	E	17	H01M-006/18	
Designated States (Regional): BE CH DE FR GB IE IT LI					
JP8250127	A		17	H01M-006/16	
HU 9600516	A2			H01M-008/00	
CN 1137178	A			H01M-006/00	
TW 342537	A			H01M-010/38	
SG 59922	A1			C08L-000/00	
US 5922493	A			H01M-004/40	Cont of application US 95399701
HU 219058	B			H01M-008/00	

### Abstract:

EP 730316 A

Electrochemical cell comprises: (i) a positive electrode; (ii) an absorber-separator; and (iii) a negative

electrode. At least one of (i), (ii) and/or (iii) comprises a porous polyvinylidene fluoride (PVdF), PVdF electrode has electrode material combined. PVdF absorber-separator has an electrolyte material combined. Also claimed is a battery.

USE - Cell is used in very thin, flexible sec. or rechargeable batteries for consumer electronic prods.

ADVANTAGE - Active material is utilised more efficiently. Active polymer and electrode/separator are segregated to obtain increased strength with min. effect on cell performance. Rechargeable cell is easily fabricated or formed from soln. Enveloping or packaging of prods. by fusion or heat lamination is facilitated.

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Dialog® File Number 351 Accession Number 10898314





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**POLYMER SYSTEM ELECTRODE AND ELECTROLYTIC ARTICLE**

**Publication Number:** 08-250127 (JP 8250127 A) , September 27, 1996

**Inventors:**

- JIEIMUZU SUTEIIBUNSON HANFURII JIYUNIA
- SUKOTSUTO RICHIIYAADO GABOORII

**Applicants**

- ELF ATOCHEM NORTH AMERICA INC (A Non-Japanese Company or Corporation), US (United States of America)

**Application Number:** 08-068932 (JP 9668932) , March 01, 1996

**Priority:**

- 7-399,701 [US 399701-1995], US (United States of America), March 03, 1995

**International Class (IPC Edition 6):**

- H01M-006/16
- H01M-002/16
- H01M-004/02
- H01M-004/62
- H01M-010/36
- H01M-010/40

**JAPIO Class:**

- 42.9 (ELECTRONICS--- Other)
- 14.2 (ORGANIC CHEMISTRY--- High Polymer Molecular Compounds)

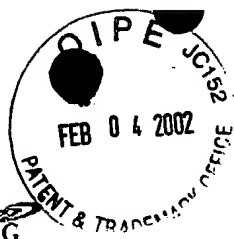
**JAPIO Keywords:**

- R003 (ELECTRON BEAM)

JAPIO

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Dialog® File Number 347 Accession Number 5294627

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**Solid electrolyte battery - having resin layers including electrolyte on them**  
**Patent Assignee: YUASA CORP KK**

**Patent Family**

Patent Number	Kind	Date	Application Number	Kind	Date	Week	Type
JP 9115550	A	19970502	JP 95268520	A	19951017	199728	B

**Priority Applications (Number Kind Date):** JP 95268520 A ( 19951017)

**Patent Details**

Patent	Kind	Language	Page	Main IPC	Filing Notes
JP 9115550	A		4	H01M-010/40	

**Abstract:**

JP 9115550 A

Surfaces of active particles which construct at least a negative pole or surface of particles formed of mixed matter of above-mentioned active particles and conductive matters have resin-made layers including electrolyte on them. Solid electrolyte is filled in a clearance of such particles, then made into a solid electrolyte battery.

**ADVANTAGE** - The solid electrolyte battery does not need a drying process and is simply constructed.

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Dialog® File Number 351 Accession Number 11326057

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**Producing solid polymer electrolyte batteries - comprises a polymer composition of plasticiser which is formed into a sheet and extracting the plasticiser with organic silicone compound**  
**Patent Assignee: TOSHIBA KK; TOSHIBA SILICONE KK**

#### Patent Family

Patent Number	Kind	Date	Application Number	Kind	Date	Week	Type
JP 9306544	A	19971128	JP 96124811	A	19960520	199807	B

**Priority Applications (Number Kind Date):** JP 96124811 A ( 19960520)

#### Patent Details

Patent	Kind	Language	Page	Main IPC	Filing Notes
JP 9306544	A		12	H01M-010/40	

#### Abstract:

JP 9306544 A

Production of a solid polymer electrolyte battery having a solid polymer electrolyte layer which holds non-aqueous electrolyte solution and is sandwiched between a positive electrode and a negative electrode comprises the steps: (a) a polymer composition containing plasticiser and polymer compound is formed into a sheet. The plasticiser is then extracted out of the sheet with a lower molecular weight organic silicone compound (OS) selected from an organic chain silicone compound of formula (I) or an organic ring silicone compound of formula (R)<sub>3</sub>SiO(Si(R)<sub>2</sub>O)<sub>m</sub>Si(R)<sub>3</sub> (II); (b) the non-aqueous electrolyte solution is impregnated into the layer so as to form the solid polymer electrolyte layer.

R is an organic group; m is an integer of 0-7; n is an integer of 3-10.

A new solid polymer electrolyte battery is also claimed, which comprises a non-aqueous electrolyte solution composition containing OS and enhances the ionic conductivity of the composition.

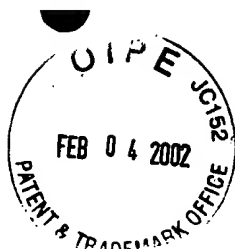
**ADVANTAGE** - Plasticiser is extracted with higher efficiency. The amount of electrolyte solution impregnated in the electrolyte layer is increased.

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Dialog® File Number 351 Accession Number 11651940

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**Polymer electrolyte secondary battery for electronic machines - has anode and cathode with foam metallic plate or metallic fibre sintering board having metal which does not form alloy with metal collector**

**Patent Assignee: ASAHI GLASS CO LTD**

#### Patent Family

Patent Number	Kind	Date	Application Number	Kind	Date	Week	Type
JP 11111265	A	19990423	JP 97266811	A	19970930	199927	B

**Priority Applications (Number Kind Date):** JP 97266811 A ( 19970930)

#### Patent Details

Patent	Kind	Language	Page	Main IPC	Filing Notes
JP 11111265	A		8	H01M-004/02	

#### Abstract:

JP 11111265 A

**NOVELTY** - A non-aqueous polymer solution with metal collector is provided between anode and cathode active materials. The anode and cathode has afoam metallic plate or metallic fiber sintering board having a metal which doesnot form an alloy with the metal collector.

**USE** - For electronic machines.

**ADVANTAGE** - Charging and discharging characteristics of the battery is enhanced. Binding capacity of the electrode active material and polymer electrolyte is increased.

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Dialog® File Number 351 Accession Number 12512687

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**Lithium secondary battery - has electrolyte in polymer matrix made of fluorine polymer that is fusible in electrolytic solvent, fluoride vinylidene polymer with specific melting point**  
**Patent Assignee: ASAHI GLASS CO LTD**

**Patent Family**

Patent Number	Kind	Date	Application Number	Kind	Date	Week	Type
JP 11003729	A	19990106	JP 97152579	A	19970610	199911	B

**Priority Applications (Number Kind Date):** JP 97152579 A ( 19970610)

**Patent Details**

Patent	Kind	Language	Page	Main IPC	Filing Notes
JP 11003729	A		5	H01M-010/40	

**Abstract:**

JP 11003729 A

**NOVELTY** - The electrolyte containing a lithium salt dissolved in a solvent is held in a polymer matrix. The polymer matrix is a blend of a fluorine polymer which is fusible in the electrolytic solvent and a fluoride vinylidene polymer which has a melting point more than 50 deg. C.

**USE** - As power supply of electronic machine.

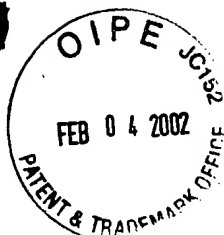
**ADVANTAGE** - The electrolyte has good maintenance property by offering excellent life cycle and superior stability.

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Dialog® File Number 351 Accession Number 12321286

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**Polymer gel electrolyte for lithium secondary batteries used as power source e.g. for audio tape recorders, camcorders and mobile phones**

**Patent Assignee:** DAIKIN IND LTD; DAIKIN KOGYO KK

**Inventors:** INO T; NAKAMURA T

### Patent Family

Patent Number	Kind	Date	Application Number	Kind	Date	Week	Type
WO 9910946	A1	19990304	WO 98JP3714	A	19980821	199916	B
JP 11067274	A	19990309	JP 97226177	A	19970822	199920	
EP 1011165	A1	20000621	EP 98938934	A	19980821	200033	
			WO 98JP3714	A	19980821		

**Priority Applications (Number Kind Date):** JP 97226177 A ( 19970822)

### Patent Details

Patent	Kind	Language	Page	Main IPC	Filing Notes
WO 9910946	A1	J	21	H01M-010/40	
Designated States (National): US					
Designated States (Regional): AT BE CH CY DE DKES FI FR GB GR IE IT LU MC NL PT SE					
JP 11067274	A		6	H01M-010/40	
EP 1011165	A1	E		H01M-010/40	Based on patent WO 9910946
Designated States (Regional): DE FR GB IT					

### Abstract:

WO 9910946 A1

**NOVELTY** A polymer electrolyte for lithium secondary batteries is made of a copolymer with (a) a segmented polymer chain having the function of maintaining the membrane strength and (b) a segmented polymer chain having the function of holding a non-aqueous electrolyte.

**DETAILED DESCRIPTION** DETAILED DESCRIPTION - A polymer electrolyte for lithium secondary batteries is made of a copolymer with (a) a segmented polymer chain having the function of maintaining the membrane strength and (b) a segmented polymer chain having the function of holding a non-aqueous electrolyte. An **INDEPENDENT CLAIM** is also included for a binder for lithium secondary batteries produced from the above copolymer.

**USE** The polymer gel electrolyte is for lithium secondary batteries (claimed) which can be used in audio tape recorders, camcorders, PCs, mobile phones and other small electronic gadgets.

ADVANTAGE The electrolyte is safe and reliable, and has high ionic conductivity, film strength, processability, and stability to chemicals and heat.

DESCRIPTION OF DRAWING(S) Structure of the block copolymer showing various segmented, functionalized polymer chains.

pp;21 DwgNo 1/1

**Technology Focus:**

TECHNOLOGY FOCUS - POLYMERS - The copolymer is a block or graft copolymer, particularly a fluorinated copolymer with at least one of the segmented polymer chains (a) and (b) which are different and are homopolymer or copolymer of one or more vinyl fluoride, vinylidene fluoride, trifluoroethylene, tetrafluoroethylene, hexafluoropropylene, chlorofluoroethylene, perfluorovinyl ether, 2,3,3,4,4,5,5-heptafluoropent-1-ene and monomers with polar group(s) in the side-chain, or copolymer of at least one of these monomers with ethylene and/or propylene.

ELECTRICAL POWER AND ENERGY - The lithium secondary batteries are prepared from a lithium salt chosen from ionizable lithium salts such as  $\text{LiPF}_6$ ,  $\text{LiBF}_4$ ,  $\text{LiClO}_4$ ,  $\text{LiAsF}_6$ ,  $\text{LiCF}_3\text{SO}_3$ ,  $\text{Li}(\text{CF}_3\text{SO}_2)_2\text{N}$ ,  $\text{Li}(\text{CF}_3\text{SO}_2)_3\text{C}$  and  $\text{LiSbF}_6$ ; and a solvent selected from ethylenecarbonate, propylene carbonate, butylene carbonate, dimethyl carbonate, diethylcarbonate, methyl ethyl carbonate, dipropyl carbonate, gamma-butyrolactone, dimethoxyethane, diethoxyethane and their mixture.

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